es

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/621,504	07/17/2003	Martin Mallinson	37213.01000	2600

7590 09/06/2005

HAYNES, BEFFEL & WOLFELD, LLP
P.O. BOX 366
HALF MOON BAY, CA 94109

EXAMINER	
FLANDERS, ANDREW C	
ART UNIT	**PAPER NUMBER**
2644	

DATE MAILED: 09/06/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO 90C (Rev 10/03)

Office Action Summary	Application No. 10/621,504	Applicant(s) MALLINSON, MARTIN	
	Examiner Andrew C. Flanders	Art Unit 2644	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 June 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3,5-46 and 48-85* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,5-46,48-74 and 82-85* is/are rejected.

7)☒ Claim(s) *75-81* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 September 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicant's arguments, filed 13 June 2005, with respect to the argued claims, except for claims 45 and 71, have been fully considered and are persuasive. The rejections of these claims have been withdrawn. New rejections are listed below.

Applicant's arguments regarding claims 45 and 71 have been fully considered but they are not persuasive.

Applicant asserts:

> "The Examiner relies on Izandpanah for performance statistics citing col. 7, lines 11-22. But one cannot simply combine Izandpanah's performance statistics with the other references and argue that the circuits disclosed by the other references perform at Izandpanah's asserted levels. That's Like combining a great sport team's win-loss record with a weak sports team's players and arguing that me combination allows the weak team to win the Super Bowl or Stanley Cup."

Examiner respectfully disagrees. Izandpanah discloses the performance characteristics relied upon within the rejections based upon the setting of pulse deviations. It would be obvious to one of ordinary skill in the art to reasonable adjust the pulses disclosed by the Ruha combination to achieve the same results. As such the argument is not persuasive. A new rejection, similar to the old rejection is stated below in view of Ruha, Oprescu and Izandpanah.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 74, 82, 83 and 84 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 74 recites the limitation "the difference element". There is insufficient antecedent basis for this limitation in the claim.

Claims 82, 83 and 84 recite the limitation "the correction signal". There is insufficient antecedent basis for this limitation in the claim.

For the purpose of expediting prosecution, it appears to the examiner as though the claimed invention should output a corrected signal from the filter and will be understood as such for the purpose of rejection.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims **1 – 3, 5, 7, 8, 11, 12, 21 – 26, 29 – 31, 34, 35, 42 – 44, 48 – 54, 56 – 58, 61 – 64, 68, 73 and 82 - 85** are rejected under 35 U.S.C. 103(a) as being unpatentable over Ruha (U.S. Patent 6,466,087) in view of Oprescu (U.S. Patent 6,208,279).

Regarding **Claims 1, 23 and 24**, Ruha discloses:

A signal processor comprising:

a pulse width modulator having a clock rate (i.e. a pulse width modulator; fig. 4 element 12; and a clock which affects the resolution of the PWM; col. 6 lines 49 – 50).

Ruha does not explicitly disclose a digital filter configured to receive an output of said pulse width modulator, wherein said output comprises a distortion, and wherein said digital filter samples said output at said clock rate to suppress said distortion.

Oprescu discloses a digital filter that further processes modulated digital signals as directed by a clock signal and as pulses propagate through the digital filter, quantization noise is attenuated; col. 4 lines 24 – 34. Attaching this digital filter to the output of Ruha's pulse width modulator would read upon the limitation of a digital filter configured to receive an output of said pulse width modulator, wherein said output comprises a distortion, and wherein said digital filter samples said output at said clock rate to suppress said distortion.

One would have been motivated to add a digital filter to the output of Ruha's pulse width modulator to ensure the output of the PWM is an ideal signal. Ruha assumes the output of the PWM to be ideal, however, it is well known in the art that quantizing any signal can introduce some noise in the form of quantization noise. It would be desirable to remove that noise in Ruha to ensure a clean, noise-free signal is passed with the use of Oprescu's digital filter.

Regarding **Claims 2 and 25**, in addition to the elements stated above regarding claims 1 and 24, the combination of Ruha in view of Oprescu further discloses an over sampling modulator that is upstream and coupled to said pulse width modulator; Fig. 4, elements 11 and 12)

Regarding **Claims 3 and 26**, in addition to the elements stated above regarding claims 2 and 25, the combination of Ruha in view of Oprescu further discloses wherein said over sampling modulator comprises a sigma-delta type modulator (col. 4 lines 23 – 35 and Fig. 4 element 11).

Regarding **Claims 5 and 29**, in addition to the elements stated above regarding claims 4 and 28, the combination of Ruha in view of Oprescu further discloses the output from the sigma-delta modulator has 2^n quantization levels, where n is in a range of about two to about eight (col. 3 lines22 – 25) and the output is read out at 2n times the clock rate of the sigma-delta modulator (col. 4 lines 36 – 38) (i.e. wherein said over sampling modulator generates an over sampled signal having a period and a total number of levels, and wherein said clock rate is at least M times said period, where M is said total number of levels in said over sampled signal).

Regarding **Claims 7 and 30**, the combination of Ruha in view of Oprescu in addition to the elements state above regarding claims 3 and 25, further discloses a filter

upstream of said pulse width modulator (i.e. element 16 which includes a filter, in fig 4 is upstream of the PWM element 12 in Ruha).

Regarding **Claims 8 and 58**, the combination of Ruha in view of Oprescu in addition to the elements stated above regarding claims 1 and 29, the combination fails to explicitly disclose wherein said digital filter comprises an IIR filter.

However, Examiner takes official notice that IIR filters are well known in the art. Further, Oprescu discloses a FIR filter. It would have been obvious to one of ordinary skill in the art at the time of the invention to substitute a IIR filter in place of an FIR filter. One would have been motivated to do so in order to achieve a given filtering characteristic using less memory and calculations than a similar FIR filter; see dspGuru reference, section 1.4.

Regarding **Claim 11**, in addition to the elements stated above regarding claim 1, the combination of Ruha in view of Oprescu further discloses a feedback path comprising said digital filter, (i.e. the optional feedback path is connected to the sigma delta modulator which is connected to the pulse width modulator which is connected to the digital filter in the combination; Fig. 4 in Ruha).

Regarding **Claims 12 and 31**, in addition to the elements stated above regarding claims 1 and 24, Ruha further discloses the signal processing system is integrated in

digital CMOS fig. 40 (i.e. an integrated circuit chip system comprising the signal processor of claim 1).

Regarding **Claims 21 and 34**, in addition to the elements stated above regarding claims 1 and 24, Ruha discloses a switching stage that is used to drive an external load (col. 4 lines 19 – 20) (i.e. an audio power amplification system).

Regarding **Claims 22 and 35**, in addition to the elements stated above regarding claims 21 and 34, Ruha discloses a switching stage that is used to drive an external load and typically the block will contain an LC filter (col. 4 lines 19 – 20). An LC is one of many various L-R-C network filter configurations that could be used to accomplish the necessary filtration. It would have been obvious to one of ordinary skill in the art at the time of the invention to use an RC filter in place of the LC filter discloses by Ruha to achieve similar results.

Regarding **Claim 42**, in addition to the elements stated above regarding claim 24, the combination of Ruha in view of Oprescu further discloses wherein said sampling occurs at a clock rate of said pulse width modulator (i.e. a digital filter that further processes modulated digital signals as directed by a clock signal and as pulses propagate through the digital filter, quantization noise is attenuated; col. 4 lines 24 – 34).

Regarding **Claim 43**, in addition to the elements stated above regarding claims 1, 23 and 24 the combination of Ruha in view of Oprescu further discloses a sigma delta modulator that interpolates an input signal to an over sampled lower resolution (col. 4 lines 23 – 25), a pulse width modulator (fig. 4 element 12) a filter upstream from an encoder stage (i.e. Oprescu's filter coupled to Ruha's PWM) (i.e. a forward path comprising a first filter stage coupled with and upstream from an encoder stage, wherein said encoder stage comprises a first order sigma-delta type modulator and a pulse width modulator), the output from the sigma-delta modulator has 2^n quantization levels, where n is in a range of about two to about eight (col. 3 lines22 – 25) and the output is read out at 2n times the clock rate of the sigma-delta modulator (col. 4 lines 36 – 38) (i.e. wherein said sigma-delta type modulator generates an over sampled signal having a period and a total number of levels, and said pulse width modulator operates at a clock rate that is at least M times said period, where M is said total number of levels in said over sampled signal and where forward path produces an output having a distortion) and the optional feedback path is connected to the sigma delta modulator which is connected to the pulse width modulator which is connected to the digital filter in the combination; (Fig. 4 in Ruha) (i.e. a feedback path comprising a digital filter that samples said output in a digital domain to suppress said distortion).

Regarding **Claim 44**, in addition to the elements stated above regarding claim 43, the combination of Ruha in view of Oprescu further discloses wherein said digital filter samples said output at said clock rate (i.e. Oprescu discloses a digital filter that

further processes modulated digital signals as directed by a clock signal and as pulses propagate through the digital filter, quantization noise is attenuated; col. 4 lines 24 – 34).

Regarding **Claim 48**, in addition to the elements disclosed above regarding claims 1, 23 and 24, Ruha further discloses the signal processing system is integrated in digital CMOS (fig. 40) and inputting an N-bit signal, operating on it (i.e. an integrated circuit chip configured to receive a pulse code modulated digital signal and to generate a pulse width modulated digital output signal, wherein said output has a distortion, and wherein said distortion is suppressed by a digital filter that operates at at least a clock rate of said pulse width modulated digital signal).

Regarding **Claims 49, 68 and 82**, Ruha discloses a sigma delta modulator that interpolates the high accuracy input signal (e.g. 13 – 16 bits) to an over sampled lower resolution but multi-bit (e.g. 2 bit to 8 bit) (i.e. modulating a first pulse code modulated signal having a first resolution into a second pulse code modulated signal having a second resolution, wherein said second resolution is smaller than said first resolution), this signal is then applied to a pulse width modulator (fig. 4 elements 12 and 14) which has a clock rate (col. 6 lines 49 – 50) (i.e. modulating said second pulse code modulated signal into a third signal comprising a plurality of pulses in time having a clock rate).

Ruha does not disclose filtering in a digital domain said plurality of pulses in time to suppress a distortion in said third signal.

Oprescu discloses a digital filter that further processes modulated digital signals as directed by a clock signal and as pulses propagate through the digital filter, quantization noise is attenuated; col. 4 lines 24 – 34. Attaching this digital filter to the output of Ruha's pulse width modulator would read upon the limitation of filtering in a digital domain said plurality of pulses in time to suppress a distortion in said third signal.

One would have been motivated to add a digital filter to the output of Ruha's pulse width modulator to ensure the output of the PWM is an ideal signal. Ruha assumes the output of the PWM to be ideal, however, it is well known in the art that quantizing any signal can introduce some noise in the form of quantization noise. It would be desirable to remove that noise in Ruha to ensure a clean, noise-free signal is passed with the use of Oprescu's digital filter.

Regarding **Claims 50, 51, 73 and 85**, in addition to the elements stated above regarding claims 49 and 82, Ruha discloses a sigma delta modulator that interpolates the high accuracy input signal (e.g. 13 – 16 bits) (this range includes 16 bits) (i.e. wherein said first resolution is between 12 bits and 24 bits inclusively and wherein said first resolution is 16 bits).

Regarding **Claims 52 and 53**, in addition to the elements stated above regarding claim 50, the combination of Ruha in view of Oprescu further discloses an over sampled

lower resolution but multi-bit (e.g. 2 bit to 8 bit) (this range includes 4 bits) (i.e. wherein said second resolution is between 2 bits and 6 bits inclusively and wherein said second resolution is 4 bits).

Regarding **Claim 54** in addition to the elements stated above regarding claim 49, the combination of Ruha in view of Oprescu further discloses a sigma delta modulator that interpolates the high accuracy input signal (e.g. 13 – 16 bits) (i.e. wherein said modulating said first pulse code modulated signal comprises using a sigma-delta type modulator).

Regarding **Claim 56**, in addition to the elements stated above regarding claim 49 the combination of Ruha in view of Oprescu further discloses the signal from the sigma delta modulator is applied to a pulse width modulator (fig. 4 elements 12 and 14) (i.e. wherein said modulating said second pulse code modulated signal comprises using a pulse width modulator).

Regarding **Claim 57** in addition to the elements stated above regarding claim 49, the combination of Ruha in view of Oprescu further discloses a digital filter that further processes modulated digital signals as directed by a clock signal and as pulses propagate through the digital filter, quantization noise is attenuated; col. 4 lines 24 – 34 (i.e. wherein said filtering comprises using a digital filter).

Regarding **Claim 61**, in addition to the elements stated above regarding claim 49, the combination of Ruha in view of Oprescu further discloses a feedback path comprising said digital filter (i.e. the optional feedback path is connected to the sigma delta modulator which is connected to the pulse width modulator which is connected to the digital filter in the combination; Fig. 4 in Ruha).

Regarding **Claim 62**, in addition to the elements stated above regarding claim 49, the combination of Ruha in view of Oprescu further discloses a pulse width modulator (fig. 4 element 12) a clock which affects the resolution of the PWM (col. 6 lines 49 – 50) (i.e. a pulse width modulator having a clock rate) and an error measurement block that includes a digital filter (fig. 4 elements 16 and fig. 6B element 16c) which receives an input from the pulse width modulator (fig 4 element 14) (i.e. wherein said plurality of pulses in time is a substantially small range of pulses in time).

Regarding **Claim 63**, in addition to the elements stated above regarding claim 63, the combination of Ruha in view of Oprescu further discloses the output from the sigma-delta modulator has 2^n quantization levels, where n is in a range of about two to about eight (col. 3 lines22 – 25) and the output is read out at 2n times the clock rate of the sigma-delta modulator (col. 4 lines 36 – 38) (i.e. wherein said modulating said first pulse code modulated signal comprises generating an over sampled signal having a period and a total number of levels, wherein said modulating said second pulse code

modulated digital signal occurs at a clock rate that is at least M times said period, where M is said total number of levels in said over sampled signal).

Regarding **Claim 64**, in addition to the elements stated above regarding claim 49, the combination of Ruha in view of Oprescu further discloses a digital filter that further processes modulated digital signals as directed by a clock signal and as pulses propagate through the digital filter, quantization noise is attenuated; col. 4 lines 24 – 34. (i.e. wherein said filtering comprises sampling at said clock rate).

Regarding **Claims 69, 70 and 84**, in addition to the elements stated above regarding claims 7, 30 and 83, Ruha discloses a switching stage that is used to drive an external load and typically the block will contain an LC filter (col. 4 lines 19 – 20). An LC is one of many various L-R-C network filter configurations that could be used to accomplish the necessary filtration. An RC integrator is also one of many choices that could be implemented. It would have been obvious to one of ordinary skill in the art at the time of the invention to use an RC integrator filter in place of the LC filter discloses by Ruha to achieve similar results. It would be desirable to use an integrator in order to achieve a linear frequency response. A linear frequency response is necessary in audio applications in order to maintain signal quality.

Regarding **Claim 83**, in addition to the elements stated above regarding claim 82, the combination of Ruha in view of Oprescu further discloses a feedback path

comprising said digital filter. It is obvious that the output of this filter would have the same bit width and frequency of the input signal due to the fact that it is sampled at the same rate. (i.e. the optional feedback path is connected to the sigma delta modulator which is connected to the pulse width modulator which is connected to the digital filter in the combination; Fig. 4 in Ruha).

Claims 6, 27 and 55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ruha (US Patent 6,466,087) in view Oprescu (U.S. Patent 6,208,279 and in further view of Huang (U.S. Patent Application Pub 2004/0213333).

Regarding **Claims 6, 27 and 55**, in addition to the elements stated above regarding claims 5, 26 and 54, the combination of Ruha in view of Oprescu fails to disclose the limitations of 6, 27 and 55.

Huang discloses a First Order sigma delta modulator (Fig. 2) (i.e. wherein said sigma delta type modulator comprises a first order sigma-delta type modulator). It would have been obvious to one of ordinary skill in the art to use Huang's sigma delta modulator as Ruha's sigma delta modulator. One would have been motivated to do so optimize the combination of Ruha in view of Oprescu for wide band input signals; see paragraphs 10 and 11 in Huang.

Claims 9, 10, 59 and 60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ruha (US Patent 6,466,087) in view of Oprescu and in further view of Lis (U.S. Patent Application Pub 2004/0037432).

Regarding **Claims 9, 10, 59 and 60**, in addition to the elements stated above regarding claims 8 and 58, the combination of Ruha in view of Oprescu fails to disclose the limitations of claims 9 and 59.

Lis discloses a low-pass filter having a single pole (paragraph 31) (i.e. wherein said IIR filter comprises a single pole filter).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the combinations filter to produce one as taught by Lis. One would have been motivated to do so to further clean the modulated signal with a low-pass filtering technique as taught by Oprescu; see col. 4 lines 45 – 50.

Claims **13, 14, 32, 33 and 65 - 67** are rejected under 35 U.S.C. 103(a) as being unpatentable over Ruha (US Patent 6,466,087) in view of Bedini (U.S. Patent 4,555,795).

Regarding **Claims 13, 14, 32, and 33**, in addition to the elements stated above regarding claims 12 and 31, the combination of Ruha in view of Oprescu further discloses a load block that typically contains a speaker (monaural output) (fig. 4 element

15 and col. 4 lines 19 – 22). Bedini discloses a binaural audio processor that can be cascaded together to provide multiple channels from a monaural input and as few as two and as many as eight channels could be provided (col. 9 lines 21 – 38) (i.e. a two-channel output or an eight-channel output). One of ordinary skill in the art at the time of the invention would have been motivated to use Bedini's processor in conjunction with Ruha's invention in order to provide a more pleasing sound for the listener. Bedini discloses that the processor would allow a monaural input to provide strategic placing of speakers around a theater to surround the audience with sound (col. 9 lines 29 – 32).

Regarding **Claim 65**, in addition to the elements stated above regarding claim 49, the combination of Ruha in view of Oprescu fails to disclose the limitations of claim 49.

Bedini further discloses a left and right bass boost channel (fig. 2 elements 32 and 34) Using this in the same manner as above regarding claims 13, 14, 31 and 32 will provide an amplified output (i.e. further comprising amplifying said third signal to produce an amplified output). Motivation to combine these elements is listed above regarding claims 13, 14, 31 and 32.

Regarding **Claim 66**, in addition to the elements stated above regarding claim 65, the combination of Ruha in view of Oprescu and in further view of Bendini further discloses a processor that works on analog signals (i.e. creating an analog signal from said amplified output).

Regarding **Claim 67**, in addition to the elements stated above regarding claim, the combination of Ruha in view of Oprescu and in further view of Bendini further discloses a switching stage that is used to drive an external load and typically the block will contain an LC filter (col. 4 lines 19 – 20). An LC is one of many various L-R-C network filter configurations that could be used to accomplish the necessary filtration. It would have been obvious to one of ordinary skill in the art at the time of the invention to use an RC filter in place of the LC filter discloses by Ruha to achieve similar results.

Claims 15 - 20 and 36 – 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ruha (US Patent 6,466,087) in view of Oprescu (U.S. Patent 6,208,279) in view of Terui (U.S. Patent 5,903,871).

Regarding Claims **15 and 36**, in addition to the elements stated above regarding claims 1 and 24, the combination of Ruha in view of Oprescu fails to disclose the limitations of claims 15 and 36.

Terui discloses a portable audio player (entire document) (i.e. a portable audio player).

One of ordinary skill in the art at the time of the invention would have been motivated to use the combination in a portable device such as Terui's hand held recorder and playback device to efficiently amplify the output signal with minimal

distortion using a class D amplifier type of arrangement. As disclosed by Ruha, Class D amplifiers are well known and widely used and are particularly useful in applications where high efficiency is required, such as portable radios; col. 1 lines 10 – 20.

Regarding **Claims 16 and 37**, in addition to the elements stated above regarding claims 15 and 36, the combination of Ruha in view of Oprescu and in further view of Terui further discloses a recording medium for storing digital audio data (col. 4 lines 50 - 59) (i.e. a digital audio signal source).

Regarding **Claims 17, 18, 38, and 39**, in addition to the elements stated above regarding claims 15 and 36, the combination of Ruha in view of Oprescu and in further view of Terui further discloses the main recording medium portion uses a magneto-optical disc (col. 5 lines 3 – 4) (i.e. an optical disk reader).

Regarding **Claims 19 and 40**, in addition to the elements stated above regarding claims 16 and 37, the combination of Ruha in view of Oprescu and in further view of Terui further discloses a recording medium for storing digital audio data (col. 4 lines 50 – 59) (i.e. a memory for storage of a digital audio file).

Regarding **Claims 20 and 41**, in addition to the elements stated above regarding claims 16 and 37, the combination of Ruha in view of Oprescu and in further view of Terui further discloses that the recording medium receives digital audio from the main

control circuit (col. 4 lines 50 – 59) (i.e. wherein said digital audio signal source comprises a digital receiver).

Claims 45 and 71 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ruha (US Patent 6,466,087) in view of Groves Jr. (U.S. Patent 6,593,807) and in further view of Izandpanah (U.S. Patent 6,735,398).

Regarding **Claim 45**, in addition to all of the elements stated above regarding claim 43, the combination of Ruha in view of Oprescu fails to disclose the limitations of claim 45.

Izandpanah discloses a pulse width transmission scheme which allows for a channel modulation depth of +/- 22.5% (col. 7 lines 11 – 22). 1 db is equal to a magnitude change of approximately 20% (i.e. wherein said signal processor exhibits a modulation depth of up to about – 1db in an audio frequency band). One of ordinary skill in the art at the time of the invention would have been motivated to use Izandpanah's modulation scheme on the Ruha and Oprescu combination in order to ensure quality transmission of signals.

Regarding **Claim 71**, in addition to all of the elements stated above regarding claim 43, the combination of Ruha in view of Oprescu fails to disclose the limitations of claim 71.

Izandpanah discloses a pulse width transmission scheme which allows for a channel modulation depth of +/- 22.5%. 0 db is equal to a magnitude change of approximately 0% (i.e. wherein said signal processor exhibits a modulation depth of up to about 0 db in an audio frequency band). One of ordinary skill in the art at the time of the invention would have been motivated to use Izandpanah's modulation scheme on the Ruha and Oprescu combination in order to ensure quality transmission of signals.

Claims 46 and 72 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ruha (US Patent 6,466,087) in view of Oprescu (U.S. Patent 6,208,279) and in further view of Pennock (U.S. Patent 6,573,850).

Regarding **Claim 46 and 72**, in addition to the elements stated above regarding claim 43, the combination of Ruha in view of Oprescu fails to disclose the limitations of claims 46 and 72.

Pennock discloses a delta sigma converter with a total Harmonic distortion of – 100 db (col. 1 lines 12 – 25) (i.e. wherein signal processor reduces a total harmonic distortion to about 90 – 100 db and wherein said signal processor reduces a total harmonic distortion to about 90 – 140 db). One of ordinary skill in the art at the time of the invention would have been motivated to modify the combination of Ruha in view of Oprescu to achieve a distortion level considered to be of a high quality level for the pulses in the combination as taught by Pennock . It would have been obvious to do so

because the technique is prevalent in many high volume areas such as digital audio; see Pennock col. 1 lines 12 – 25.

Allowable Subject Matter

Claim 74 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action.

Claims 75 – 81 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew C. Flanders whose telephone number is (571) 272-7516. The examiner can normally be reached on M-F 8:30 - 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vivian Chin can be reached on (571) 272-7848. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

acf

VIVIAN CHIN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600